

PATENT APPLICATION  
Application No. 10/709,831  
Paper Dated: January 19, 2006  
Attorney Docket No. TSENTER.00101

### AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application.

1. (currently amended) A method of charging a Li-based batteries battery by constant current and then by constant voltage to minimum current, with following operations comprising:

a. Measurement of Measuring battery ohmic resistance of a Li-based battery;

b. Setting of a minimum overvoltage protection value; and

c. Setting of a minimum charging current depending on the battery ohmic resistance and the overvoltage protection value.

2. (currently amended) The method of charging Li-based battery of claim 1, wherein said overvoltage protection value is specified as comprises a difference between maximum voltage and instantaneous open-circuit voltage at battery terminals of the battery after 1 to 10 ms of current change interruption.

3. (currently amended) The method of charging Li-based battery of claim 1, wherein said minimum charging current is chosen as a ratio of the minimum overvoltage protection value to the battery ohmic resistance.

4. (currently amended) The method of charging Li-based battery of claims 1-3, wherein the maximum voltage,  $V_{max}$ , ranges between 4.0 and 4.2 V per cell.

5. (currently amended) The method of charging Li-based battery of claim 1, wherein the constant voltage is instantaneous open-circuit voltage.

6. (currently amended) The method of charging Li-based battery of claim 1, wherein the constant voltage equals maximum voltage.

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7. (currently amended) ~~The method of charging Li-based battery of claim 1,~~ wherein the constant voltage equals maximum voltage plus a product of the minimum charging current and the ohmic resistance.

8. (currently amended) ~~The method of charging Li-based battery of claim 1,~~ wherein the minimum overvoltage protection is 0 to 50 mV.

9. (currently amended) ~~The method of charging Li-based battery of claim 1,~~ wherein a tolerance of supporting constant voltage has to be less than the minimum ~~overvoltage~~ overvoltage protection.

10. (currently amended) ~~The method of charging Li-based batteries of claims 1,~~ wherein the minimum charging current reaches 0.6-0.05C rate.

11. (currently amended) ~~A method of Li-based battery equalization in a process of battery charging and discharging, wherein comprising periodically connecting an individual lithium cell is periodically connected to a battery lithium cell having minimum discharging voltage until voltage of the two cells is getting equal to a dynamically preselected voltage.~~

12. (cancelled)

13. (currently amended) ~~A method of Li-based battery equalization, wherein three series-connected Ni-based batteries are connected in parallel to each an Li-based cell, and the Ni-based cells are part of a charging device.~~

14. (currently amended) ~~A method of hybridizing lithium battery and creating one hybrid power source, wherein each a lithium cell permanently contains three series- connected Ni-based cells, wherein the Li-based cell and the Ni-based cells have parallel connection.~~

15. (currently amended) ~~The method of charging Li-based battery of claims 11 13 and 12 14 further comprising charging by constant current, and constant voltage, wherein charging is interrupted when charging current reaches stationery value.~~

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16. (cancelled)

17. (currently amended) ~~Battery control~~ The method of claim 14, wherein ohmic resistance is measured as a ratio of two voltage differences corresponding to two current differences measured within a 1- to 10-~~ms~~, millisecond time interval after current interruption.

18. (currently amended) ~~Battery control~~ The method of claim 14, wherein one of two currents is zero.

19. (currently amended) ~~Battery control~~ The method of claim 14, further comprising measuring wherein chemical resistance is measured of the battery as ratio of two voltage differences sampled prior to 10 ms and after 150 ms current change corresponding to two current differences.

20. (cancelled)

21. (currently amended) ~~The battery control method of claim 14, wherein:~~ further comprising determining nonstationary open-circuit voltage is defined as:

$E_0 = V - I(R_{ohm} + R_{ch})$ , where:

$V$  = difference between battery terminal voltage;

and product of sum of  $R_{ohm}$  = ohmic resistance; and

$R_{ch}$  = chemical resistances; and

$I$  = current.

22. (currently amended) ~~The battery control method of claims 21, 14 and 19,~~ wherein nonstationary open-circuit voltage is used to recognize battery state-of-charge.

23. (currently amended) ~~A method of measuring battery~~ The battery control method of claim 14, wherein electrical double layer capacity is measured by comprising

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sampling chemical polarization for 10 to 15 ms after current interruption, and obtaining a ratio of product of current and time interval to chemical polarization difference for this time interval.

24. (currently amended) ~~The method of charging and controlling Li-based battery~~ of claims 1, 11, and 14 wherein said battery is an Li-ion battery.

25. (currently amended) ~~The method of charging and controlling Li-based battery~~ of claims 1, 11, and 14 wherein said battery is an Li polymer battery.

26. (currently amended) ~~The method of charging and controlling Li-based battery~~ of claims 1, 11, and 14 wherein said battery is a metallic Li battery.

27. (new) The method of claim 1, wherein ohmic resistance is measured as the ratio of a voltage difference to a current difference over a time period between 1 millisecond and 10 milliseconds after current interruption.

28. (new) The method of claim 21, wherein  $R_{ch}$  is measured as a ratio wherein the numerator comprises a difference between a first voltage sampled prior to 10 milliseconds and a second voltage sampled after 150 milliseconds after current interruption, and the denominator comprises a current charge value.

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